

What is Claimed:

1. A method for coordinated control of a switched power capacitor with an integrated resonance protection function, comprising the steps of:

- 5 A. receiving control parameters and an indication of whether a harmonic resonance condition is present;
- B. if a harmonic resonance condition is present, then adjusting said control parameters; and
- 10 C. performing capacitor switching operations based on said control parameters and returning to step A.

2. A method as in claim 1, wherein said step of receiving control parameters comprises receiving target control parameters and actual control parameters.

- 15 3. A method as in claim 1, wherein said step of receiving control parameters comprises receiving at least one of the power factor and node voltage.

- 20 4. A method as in claim 1, wherein said step of adjusting control parameters if a harmonic resonance condition is present comprises the steps of:
- determining if a resonance flag is set;
- if a resonance flag is not set, then
- a. determining if a resonance condition is present;
- b. if a resonance condition is present, then adjusting control parameters and setting a resonance flag;
- 25 if a resonance flag is set, then
- a. adjusting control parameters
- b. determining if a resonance flag resets condition is present; and
- c. if a resonance flag reset condition is present, then resetting the resonance flag.

5. A method as in claim 4, wherein said step of determining if a resonance flag reset condition is present comprises determining if at least one of a pre-determined time delay has expired and a system condition change exceeding a pre-determined threshold value has occurred.

5 6. A method as in claim 5, wherein said step of determining if a system condition change exceeding a pre-determined threshold value has occurred comprises determining if at least one of a load change, a system source impedance change, and a network topology change exceeding a pre-determined threshold value has occurred.

10 7. A method as in claim 1, wherein said step of adjusting the control parameters comprises reducing the reactive power by the reactive power provided by one capacitor bank.

15 8. A method as in claim 1, wherein said step of performing capacitor switching operations comprises the steps of:
determining if capacitor switching operations are needed; and
if capacitor switching operations are needed, then performing capacitor switching operations.

20 9. A method as in claim 8, wherein said step of determining if capacitor switching operations are needed comprises the steps of:
comparing actual control parameters with target control parameters; and
determining whether a capacitor switching operation would make actual control parameters closer to target control parameters.

25 10. A method as in claim 9, further comprising at least one of determining whether each capacitor bank is connected or disconnected and determining the size of each capacitor.

11. A system for coordinated control of a switched power capacitor with an integrated resonance protection function, comprising a control processor programmed to perform the following process:

- 5 A. receive control parameters and an indication of whether a harmonic resonance condition is present;
- B. if a harmonic resonance condition is present, then adjust said control parameters; and
- C. perform capacitor switching operations based on said control parameters and return to step A.

10 12. A system as in claim 11, wherein said control parameters comprise target control parameters and actual control parameters.

13. A system as in claim 12, wherein said control parameters comprise at least one of the power factor and node voltage.

15 14. A system as in claim 11, wherein adjusting control parameters if a harmonic resonance condition is present comprises:

- determining if a resonance flag is set;
- if a resonance flag is not set, then
 - 20 a. determining if a resonance condition is present;
 - b. if a resonance condition is present, then adjusting control parameters and setting a resonance flag;
- if a resonance flag is set, then
 - a. adjusting control parameters
 - b. determining if a resonance flag resets condition is present; and
 - 25 c. if a resonance flag reset condition is present, then resetting the resonance flag.

15. A system as in claim 14, wherein said resonance flag reset condition comprises at least one of the expiration of a pre-determined time delay and a system condition change exceeding a pre-determined threshold value.

30

16. A system as in claim 15, wherein said system condition change comprises at least one of a load change, a system source impedance change, and a network topology change.

5 17. A system as in claim 11, wherein adjusting the control parameters comprises reducing the reactive power by the reactive power provided by one capacitor bank.

18. A system as in claim 11, wherein performing capacitor switching operations comprises:
10 determining if capacitor switching operations are needed; and
if capacitor switching operations are needed, then performing capacitor switching operations.

19. A system as in claim 18, wherein determining if capacitor switching
15 operations are needed comprises:
comparing actual control parameters with target control parameters; and
determining whether a capacitor switching operation would make actual control parameters closer to target control parameters.

20. A system as in claim 19, further comprising at least one of determining whether each capacitor bank is connected or disconnected and determining the size of each capacitor.